Office of Naval Research
Human Systems Department

Massachusetts Institute of Technology
Artificial Intelligence Laboratory
Design Technology Group

=WALL

ELECTRONIC CARD WALL

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William Porter

Paul Keel

Edith Ackermann

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

January 15-17th 2002

TC3 WORKSHOP
Cognitive Elements of Effective Collaboration

University of San Diego
5998 Alcala Park
San Diego, CA 92110

Sponsored by
Office of Naval Research (ONR)
Human Systems Dept.
Dr. Michael Letsky

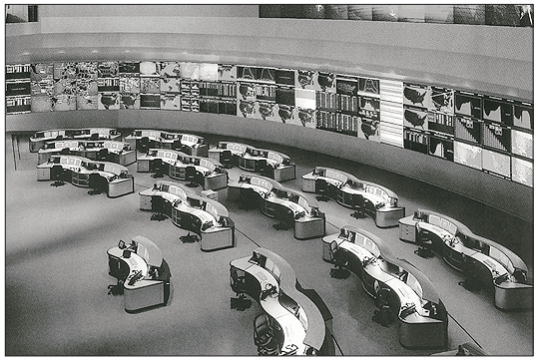
Coordinated by
Space and Naval Warfare Systems Center San Diego (SPAWAR)
Simulation & Human Systems Technology Division
Dr. Michael Cowen

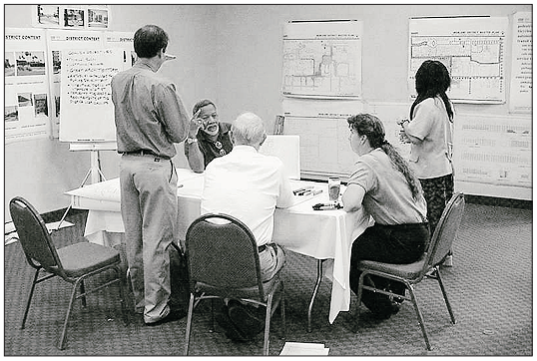
DECISION MAKING

Search and categorize large amounts of graphical and contextual information.

Produce innovative solutions to complex and time-critical problems.

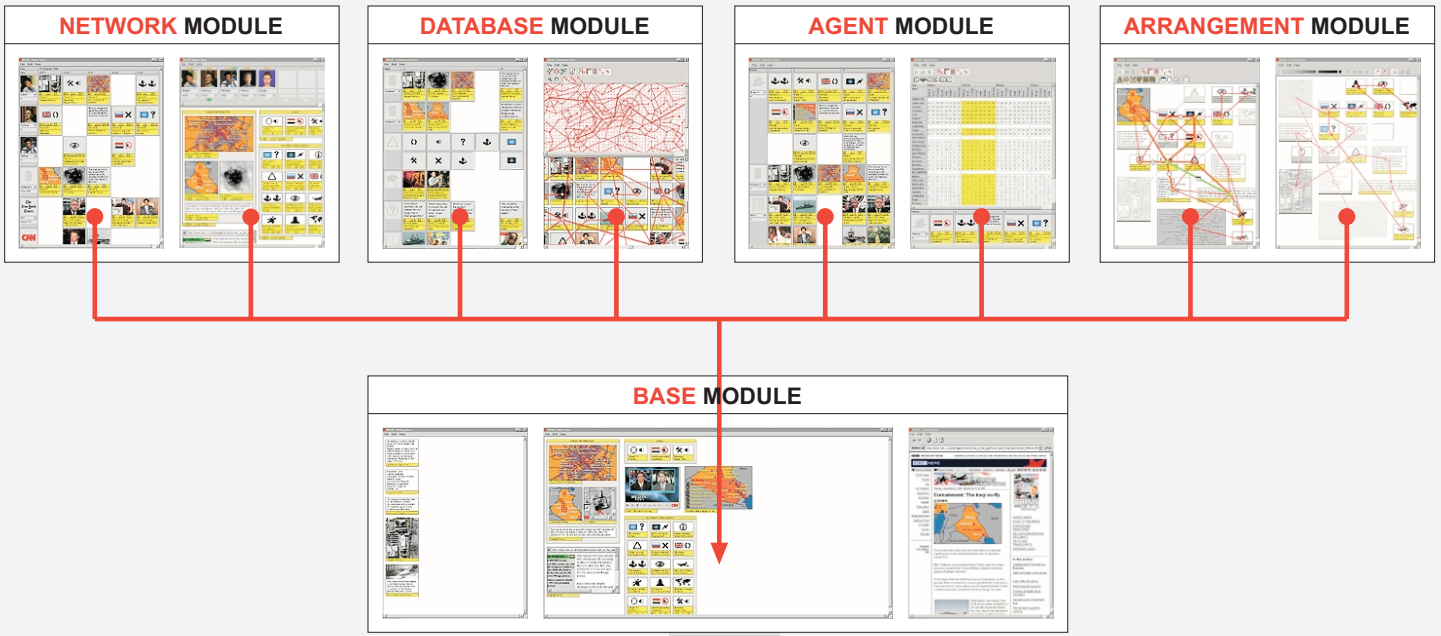
Operate in teams and collaborate remotely, asynchronously and across organizational boundaries.



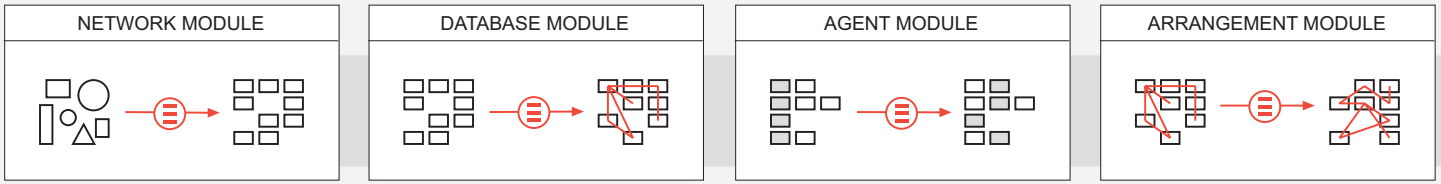


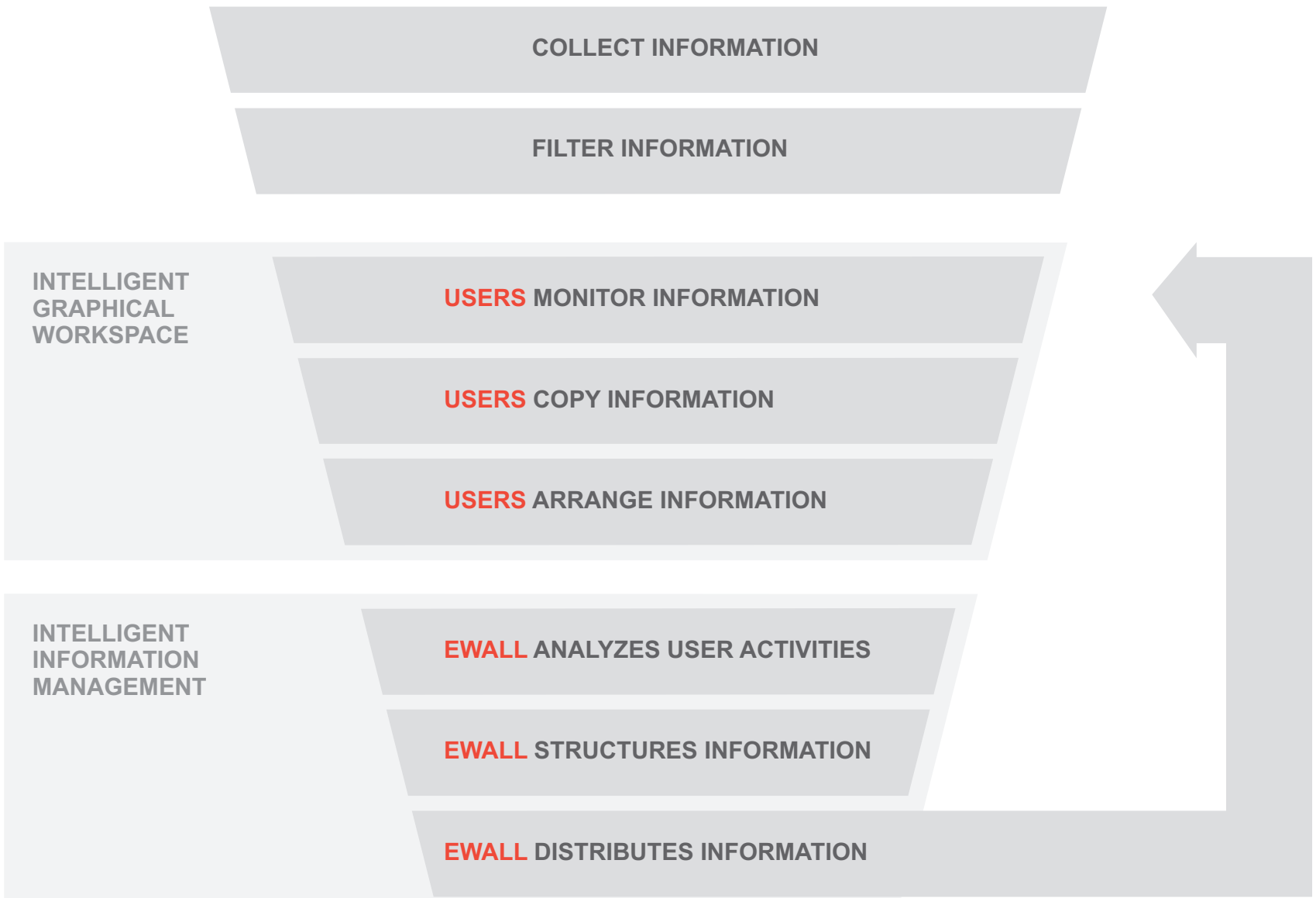
Photomontage combining EWall mock-up windows and the meeting space of the SwissHouse

INTELLIGENT GRAPHICAL WORKSPACE



INTELLIGENT INFORMATION MANAGEMENT




COLLECT INFORMATION
FILTER INFORMATION
INTELLIGENT GRAPHICAL WORKSPACE
USERS MONITOR INFORMATION
USERS COPY INFORMATION
USERS ARRANGE INFORMATION
INTELLIGENT INFORMATION MANAGEMENT
EWALL ANALYZES USER ACTIVITIES
EWALL STRUCTURES INFORMATION
EWALL DISTRIBUTES INFORMATION

Photomontage combining EWall mock-up windows and the meeting space of the SwissHouse

Photomontage combining EWall mock-up windows and a photograph of StudioMIT

Photomontage combining EWall mock-up windows and a photograph of StudioMIT

Photograph of StudioMIT

EWALL NETWORK MODULE

Sporadic changes to information sources are hard to keep track of.

EWall will scan for changes to selected information sources.

Data in different formats and sizes are difficult to compare.

EWall will convert and abstract data into comparable information objects.

Abstract representations of data for comparison purposes necessarily eliminate important contextual information.

EWall will hyperlink information objects to their original data source.

Sorting and categorizing large amounts of information is time and labor intensive.

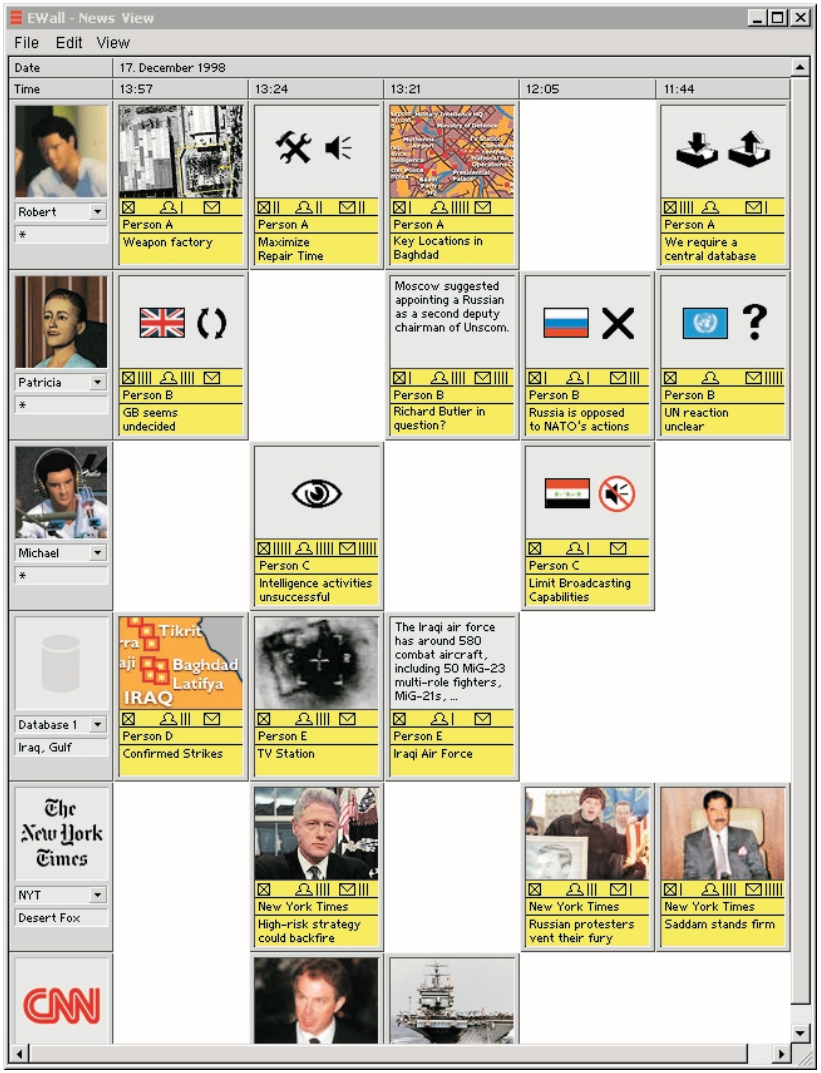
EWall will display information objects in a subject-time matrix.

Remotely distributed users are difficult to visualize individually and overview as a group.

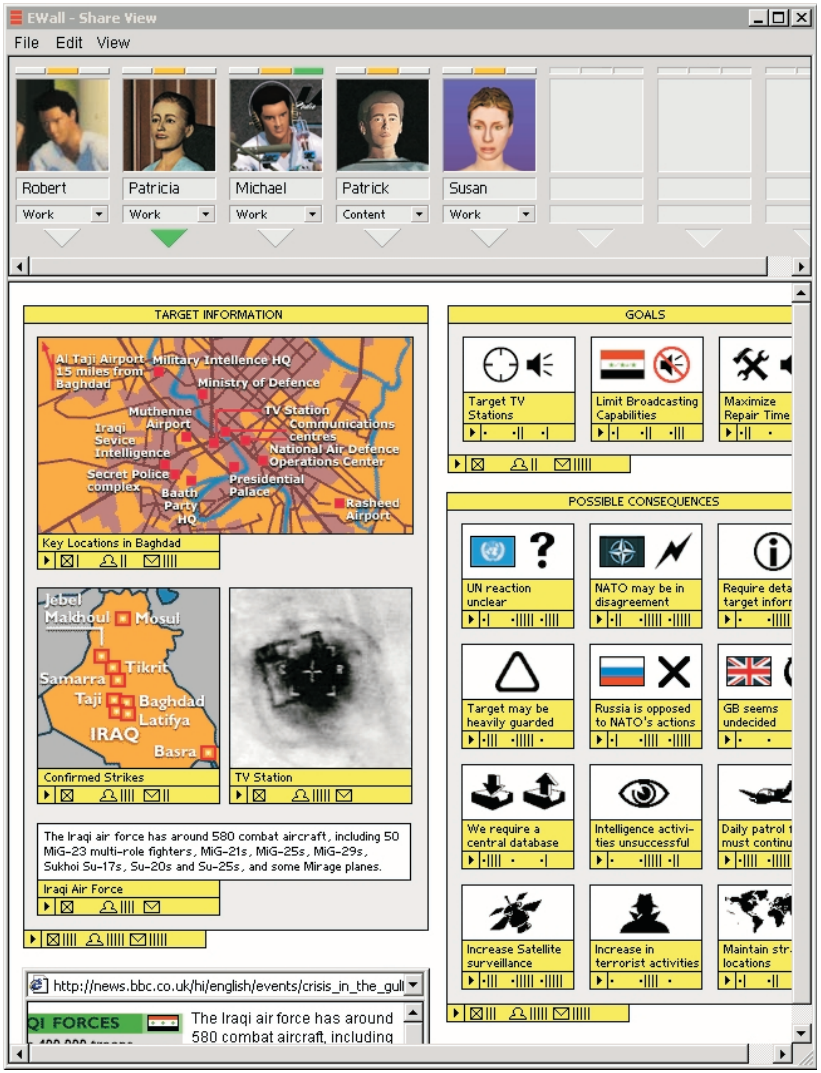
EWall will enable users to keep track of, inspect and compare individuals' work areas.

Remotely distributed users need to be guided and coordinated in order to arrive at a conclusion.

EWall provides the mechanisms to submit work tasks, announcements and questions to specific users.



News View

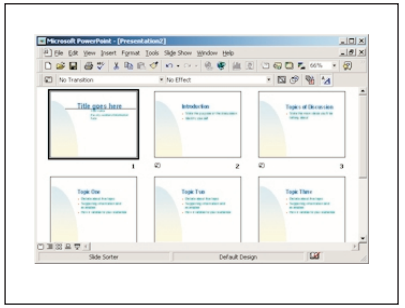


Share View

MOCK-UP


DISCOVER
FIRST CARD
VISA


Michael Fraser
Head of Humbul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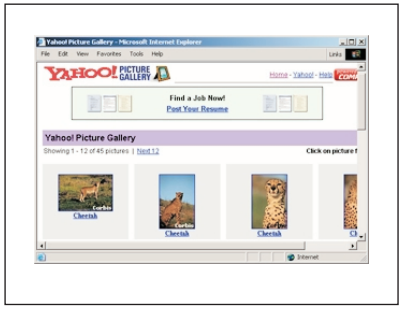
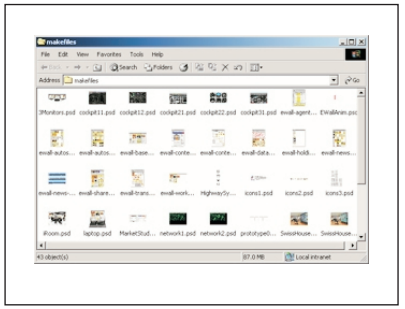
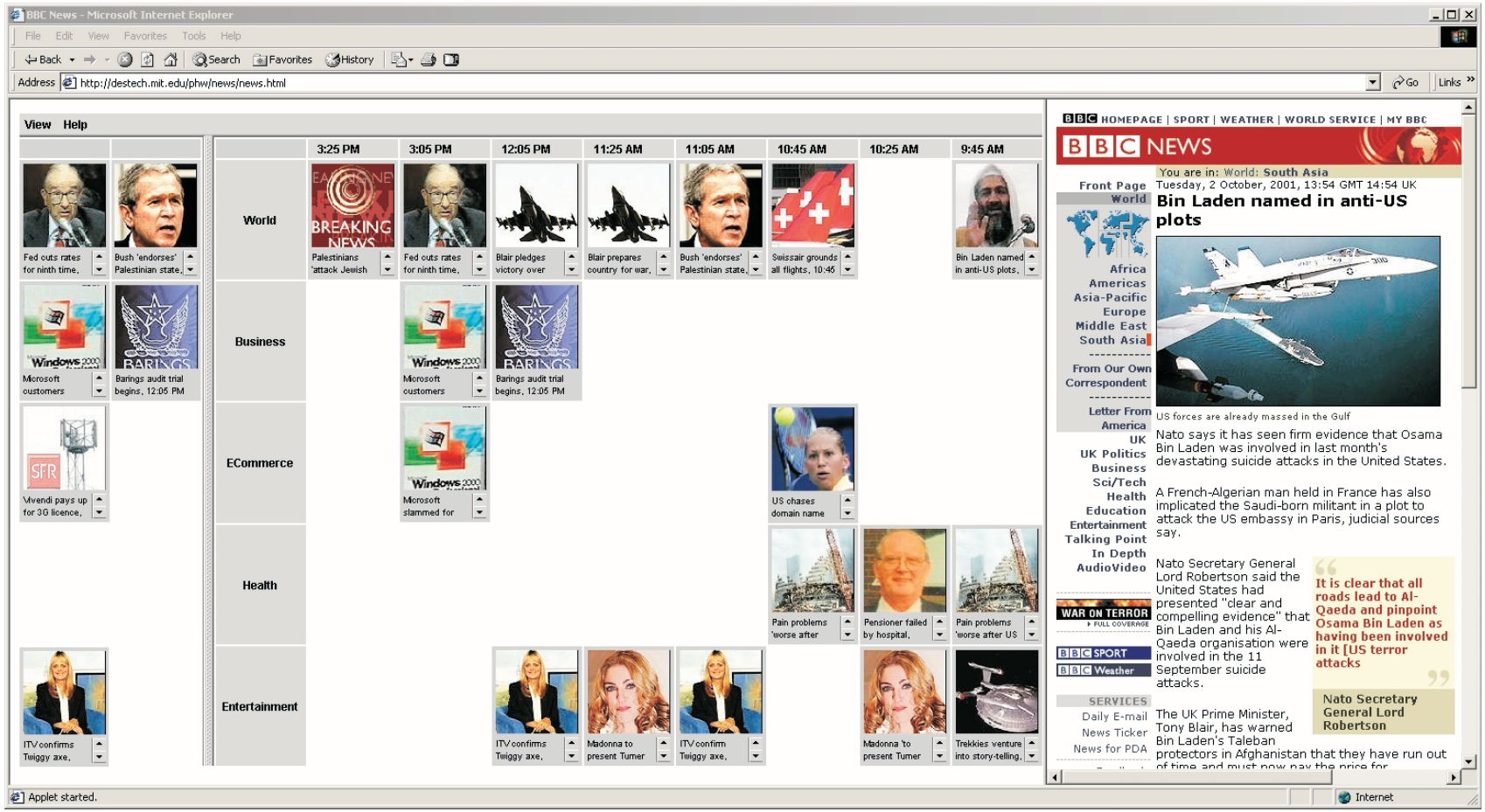
Title goes here
Introduction
Slide Sorter
Default Design


Ektachrome
TRANSPARENCY
PROCESSED BY Kodak

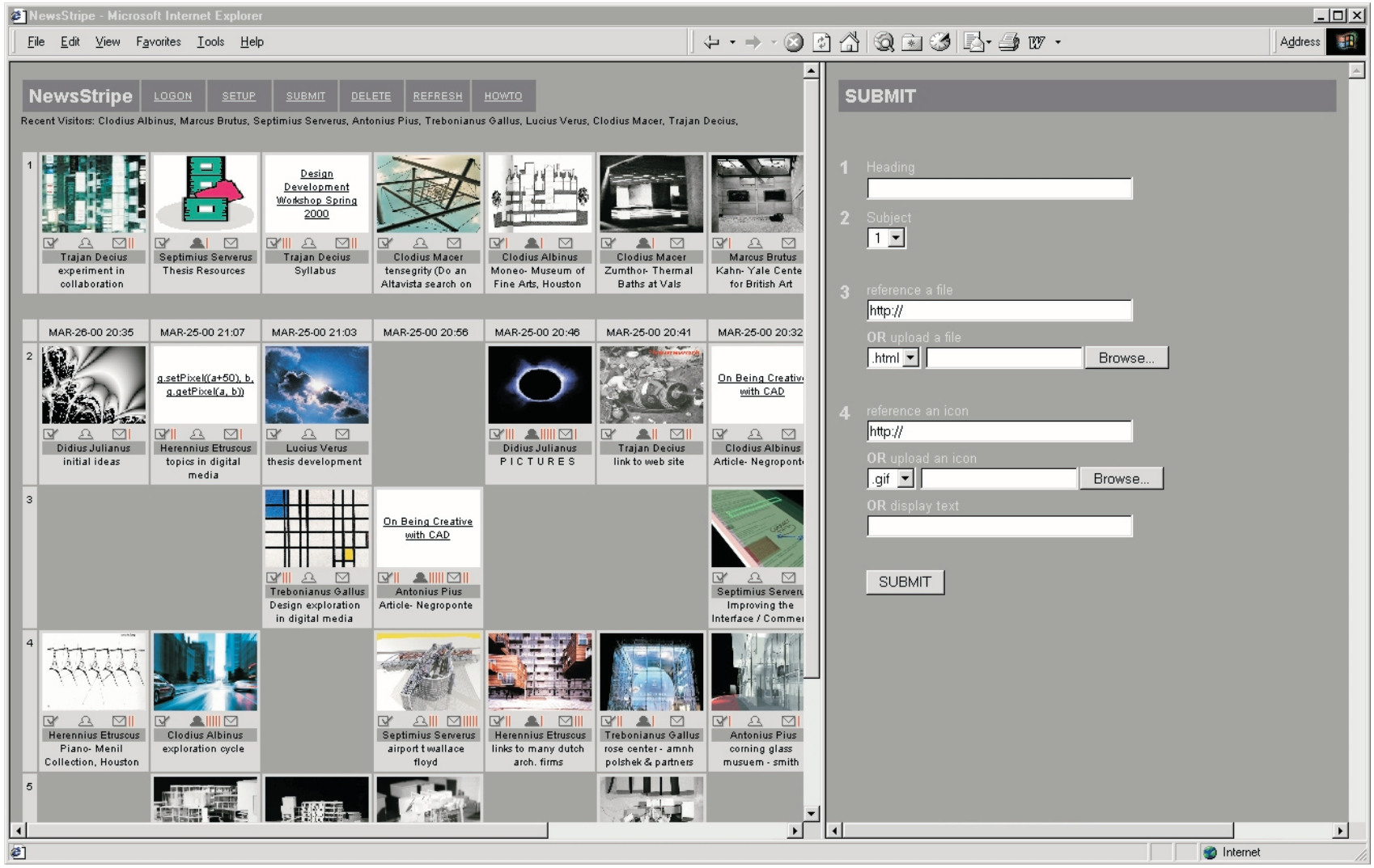

Yahoo! Picture Gallery - Microsoft Internet Explorer
YAHOO! PICTURE GALLERY
Find a Job Now!
Post Your Resume
Yahoo! Picture Gallery
Cheetah


Combat Readiness Medal
AF Good Conduct Medal
Good Conduct Medal
Air Reserve Forces Meritorious Service Medal
Outstanding Airman of the Year Ribbon
Air Force Recognition Ribbon
American Defense Service Medal
American Campaign Medal
Asiatic-Pacific Campaign Medal
Euro-African-Middle Eastern Campaign
World War II Victory Medal
Army of Occupation Medal
Medal for Humane Action
National Defense Service Medal
Korean Service Medal
Antarctica Service Medal
Armed Forces Expeditionary Medal
Vietnam Service Medal
Southwest Asia Service Medal
Armed Forces Service Medal
Humanitarian Service Medal
Military Outstanding Volunteer Service Medal
AF Overseas Ribbon Short
AF Overseas Ribbon Long
AF Longevity Service
Armed Forces Reserve Medal
USAF NCO PME Graduate Ribbon
Basic Military Training Honor Graduate


makefiles


BBC News - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites History
Address http://destech.mit.edu/phw/news/news.html
Go Links
View Help
3:25 PM
3:05 PM
12:05 PM
11:25 AM
11:05 AM
10:45 AM
10:25 AM
9:45 AM
World
Business
ECommerce
Health
Entertainment
Fed cuts rates for ninth time,
Bush 'endorses' Palestinian state,
Palestinians 'attack Jewish
Blair pledges victory over
Blair prepares country for war,
Swissair grounds all flights, 10:46
Bin Laden named in anti-US plots,
Microsoft customers
Barings audit trial begins, 12:05 PM
Vivendi pays up for 3G licence,
Microsoft slammed for
US chases domain name
Pain problems 'worse after
Pensioner failed by hospital,
Pain problems 'worse after US
ITV confirms Twiggy axe,
Madonna to present Turner
ITV confirm Twiggy axe,
Trekkies venture into story-telling,
BBC HOMEPAGE | SPORT | WEATHER | WORLD SERVICE | MY BBC
BBC NEWS
You are in: World: South Asia
Front Page
World
Africa
Americas
Asia-Pacific
Europe
Middle East
South Asia
From Our Own Correspondent
Letter From America
UK
UK Politics
Business
Sci/Tech
Health
Education
Entertainment
Talking Point
In Depth
AudioVideo
WAR ON TERROR
FULL COVERAGE
BBC SPORT
BBC Weather
SERVICES
Daily E-mail
News Ticker
News for PDA
Tuesday, 2 October, 2001, 13:54 GMT 14:54 UK
Bin Laden named in anti-US plots
US forces are already massed in the Gulf
Nato says it has seen firm evidence that Osama Bin Laden was involved in last month's devastating suicide attacks in the United States.
A French-Algerian man held in France has also implicated the Saudi-born militant in a plot to attack the US embassy in Paris, judicial sources say.
Nato Secretary General Lord Robertson said the United States had presented "clear and compelling evidence" that Bin Laden and his Al-Qaeda organisation were involved in the 11 September suicide attacks.
It is clear that all roads lead to Al-Qaeda and pinpoint Osama Bin Laden as having been involved in it [US terror attacks
Nato Secretary General Lord Robertson
The UK Prime Minister, Tony Blair, has warned Bin Laden's Taleban protectors in Afghanistan that they have run out
Applet started.
Internet

PROTOTYPE


NewsStripe - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Address
NewsStripe
LOGON
SETUP
SUBMIT
DELETE
REFRESH
HOWTO
Recent Visitors: Clodius Albinus, Marcus Brutus, Septimius Serverus, Antonius Pius, Trebonianus Gallus, Lucius Verus, Clodius Macer, Trajan Decius,
Design Development Workshop Spring 2000
Trajan Decius experiment in collaboration
Septimius Serverus Thesis Resources
Trajan Decius Syllabus
Clodius Macer tensegrity (Do an Altavista search on
Clodius Albinus Moneo- Museum of Fine Arts, Houston
Clodius Macer Zumthor- Thermal Baths at Vals
Marcus Brutus Kahn- Yale Cente for British Art
MAR-26-00 20:35
MAR-25-00 21:07
MAR-25-00 21:03
MAR-25-00 20:56
MAR-25-00 20:46
MAR-25-00 20:41
MAR-25-00 20:32
Didius Julianus initial ideas
g.setPixel((a+50), b, g.getPixel(a, b))
Herennius Etruscus topics in digital media
Lucius Verus thesis development
Didius Julianus P I C T U R E S
Trajan Decius link to web site
On Being Creativ with CAD
Clodius Albinus Article- Negropont
On Being Creative with CAD
Trebonianus Gallus Design exploration in digital media
Antonius Pius Article- Negroponte
Septimius Serveru Improving the Interface / Commer
Herennius Etruscus Piano- Menil Collection, Houston
Clodius Albinus exploration cycle
Septimius Serverus airport t wallace floyd
Herennius Etruscus links to many dutch arch. firms
Trebonianus Gallus rose center - amnh polshek & partners
Antonius Pius corning glass musuem - smith
SUBMIT
1 Heading
2 Subject
1
3 reference a file
http://
OR upload a file
.html
Browse...
4 reference an icon
http://
OR upload an icon
.gif
Browse...
OR display text
SUBMIT
Internet

PROTOTYPE

EWALL BASE MODULE

Decision-makers must process a lot of information in a short period of time.

EWall provides an environment to efficiently compare and organize large amounts of information.

Group meetings require individuals to develop a common understanding of a problem and to negotiate potential solutions.

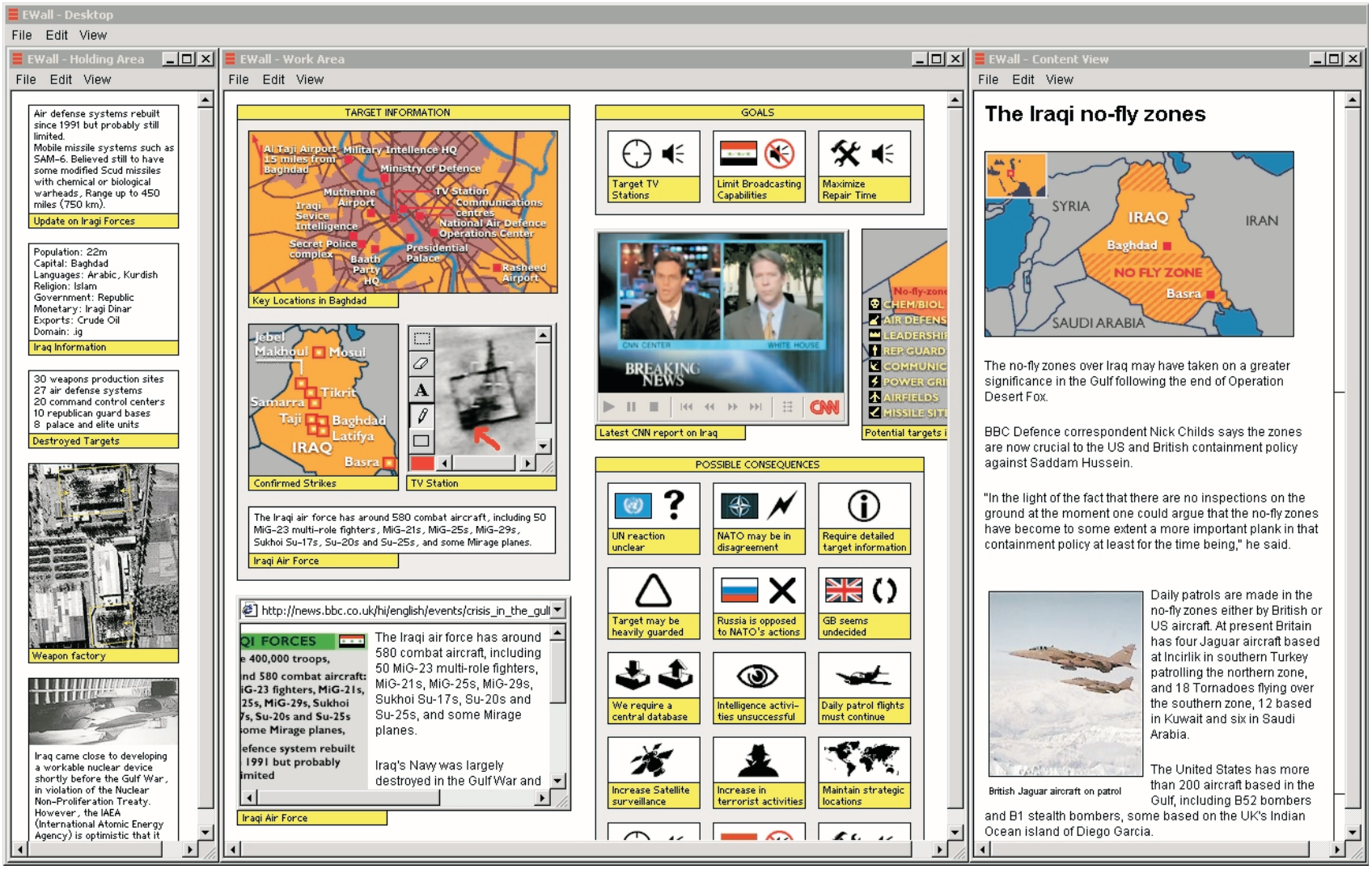
EWall will provide a shared space for people to collaboratively arrange information.

Individuals have their unique ways of arranging information.

EWall will allow users to individualize shared information arrangements.

Creative problem solving requires both making things as well as looking at things that others made.

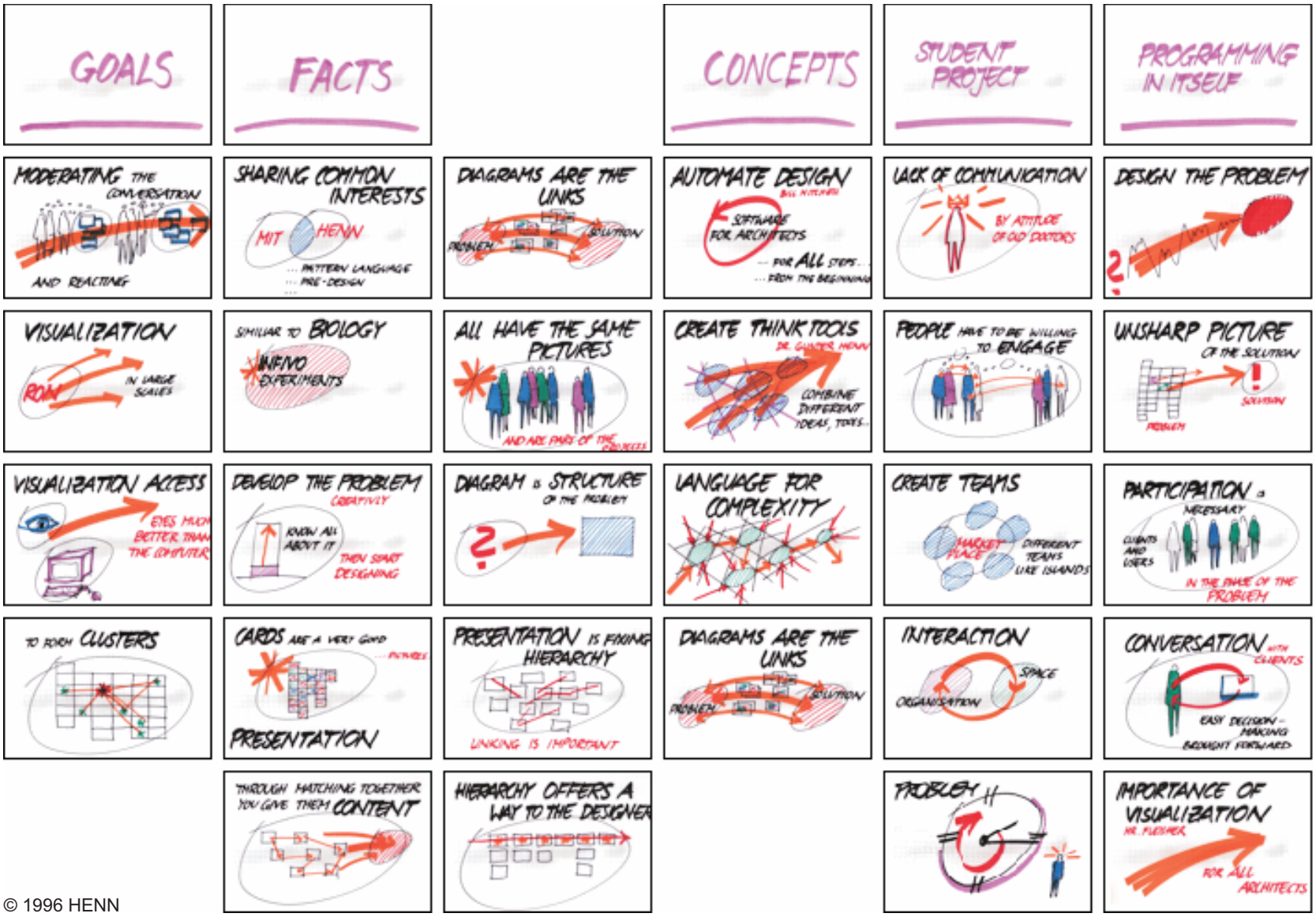
EWall will provide a space and the tools for acting as well as viewing.



Holding Area Work Area Content View

MOCK-UP


© 2001 HOK


GOALS
FACTS
CONCEPTS
STUDENT PROJECT
PROGRAMMING IN ITSELF
MODERATING THE CONVERSATION
AND REACTING
SHARING COMMON INTERESTS
MIT
HENN
... PATTERN LANGUAGE
... PRE-DESIGN
DIAGRAMS ARE THE LINKS
PROBLEM
SOLUTION
AUTOMATE DESIGN
SOFTWARE FOR ARCHITECTS
... FOR ALL STEPS ...
... FROM THE BEGINNING
LACK OF COMMUNICATION
BY ATTITUDE OF OLD DOCTORS
DESIGN THE PROBLEM
VISUALIZATION
ROW
IN LARGE SCALES
SIMILAR TO BIOLOGY
INFINITE EXPERIMENTS
ALL HAVE THE SAME PICTURES
AND ADD PART OF THE
CREATE THINK TOOLS
DR. GÜNTER HENN
COMBINE DIFFERENT IDEAS, TOOLS...
PEOPLE HAVE TO BE WILLING TO ENGAGE
UNSHARP PICTURE OF THE SOLUTION
SOLUTION
PROBLEM
VISUALIZATION ACCESS
EYES MUCH BETTER THAN THE COMPUTER
DEVELOP THE PROBLEM
CREATIVITY
KNOW ALL ABOUT IT
THEN START DESIGNING
DIAGRAM a STRUCTURE OF THE PROBLEM
LANGUAGE FOR COMPLEXITY
CREATE TEAMS
MARKET PLACE
DIFFERENT TEAMS LIKE ISLANDS
PARTICIPATION a NECESSARY
CLIENTS AND USERS
IN THE MIDDLE OF THE PROBLEM
TO FORM CLUSTERS
CARDS ARE A VERY GOOD ... METHODS
PRESENTATION
PRESENTATION IS FIXING HIERARCHY
LINKING IS IMPORTANT
DIAGRAMS ARE THE LINKS
PROBLEM
SOLUTION
INTERACTION
SPACE
ORGANISATION
CONVERSATION WITH CLIENTS
EASY DECISION-MAKING BROUGHT FORWARD
THROUGH MATCHING TOGETHER YOU GIVE THEM CONTENT
HIERARCHY OFFERS A WAY TO THE DESIGNER
PROBLEM
IMPORTANCE OF VISUALIZATION
MR. FLEISCHER
FOR ALL ARCHITECTS

EWALL DATABASE MODULE

Relationships in spatial information arrangements are implicit.

EWall will automatically convert spatial information arrangements into networked information structures.

Relationships between information may change.

EWall will maintain a dynamic network of relationships that continuously adapts to the spatial information arrangements of individual users.

The commonalties between multiple information arrangements are difficult to determine.

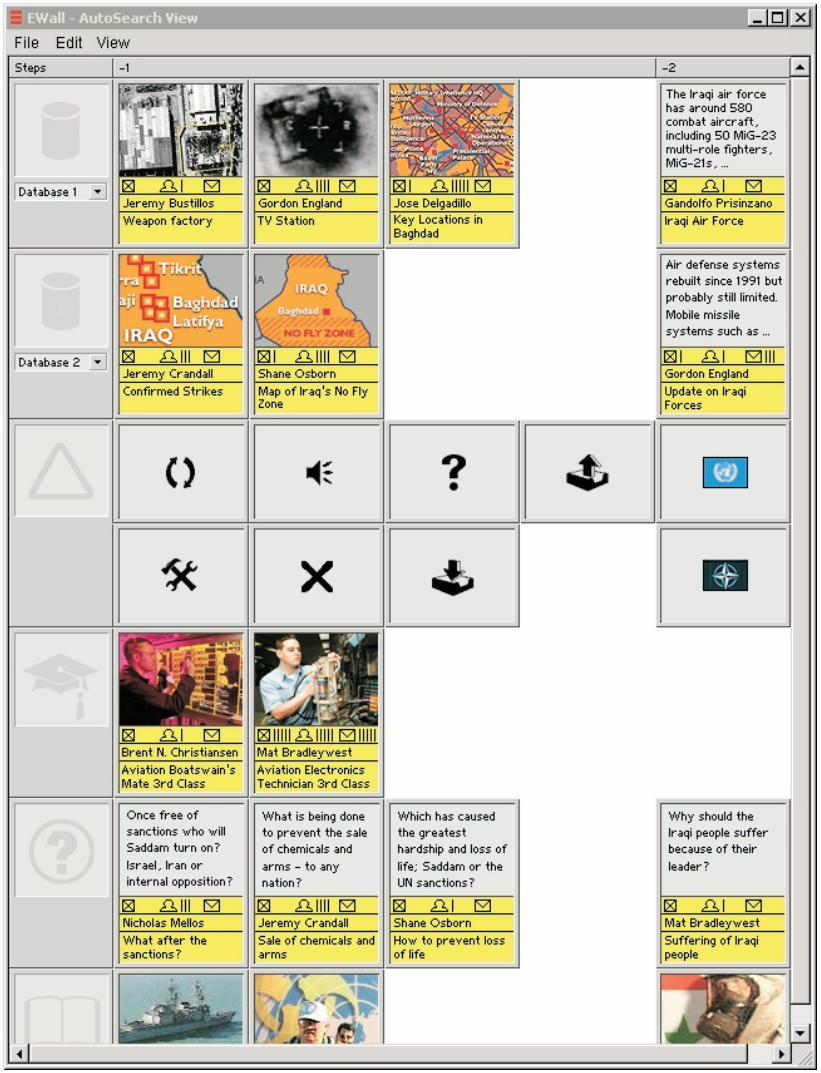
EWall will merge individual user arrangements into a shared database and determine structural differences.

Structuring and maintaining a shared database is time intensive.

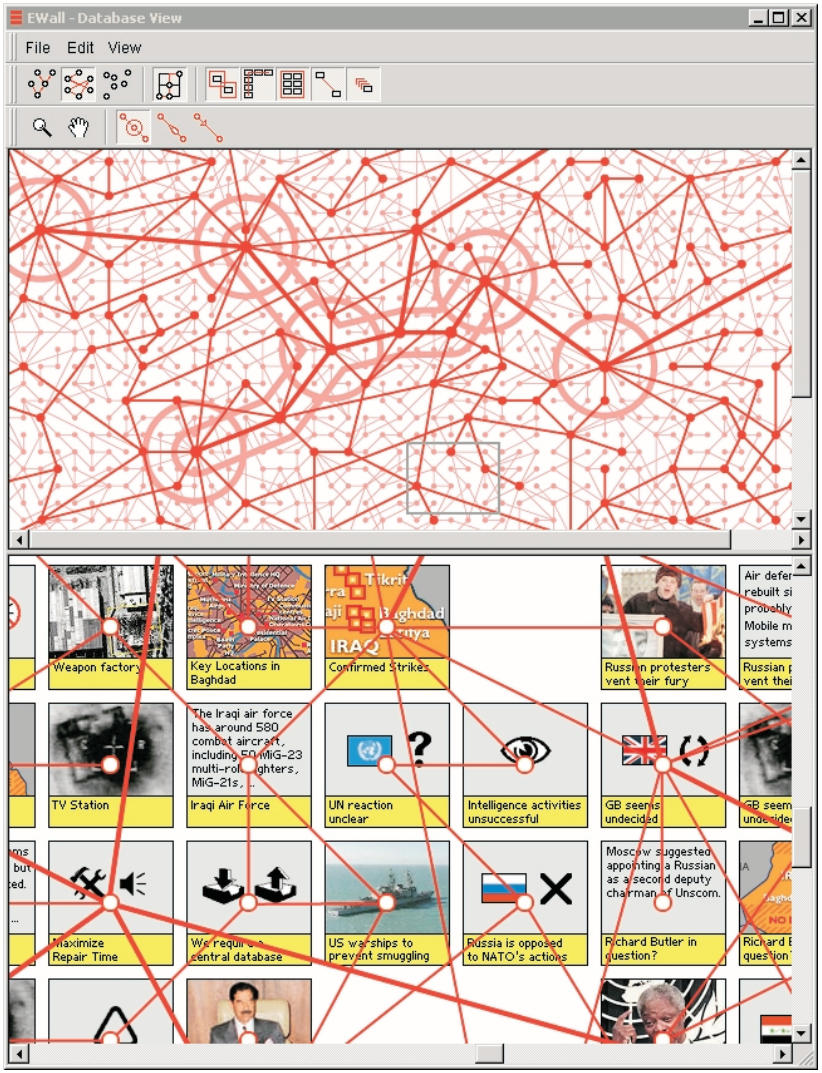
EWall will automatically structure and visualize the content of shared databases.

The search for relevant content in multiple databases is time intensive.

EWall automatically initiates search queries relevant to the current arrangement on a users work area.

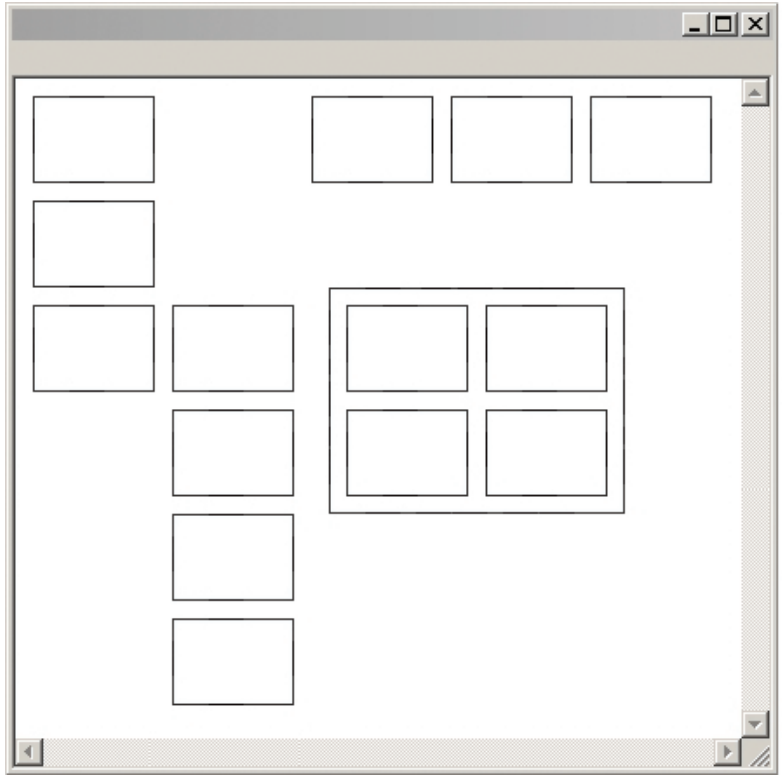


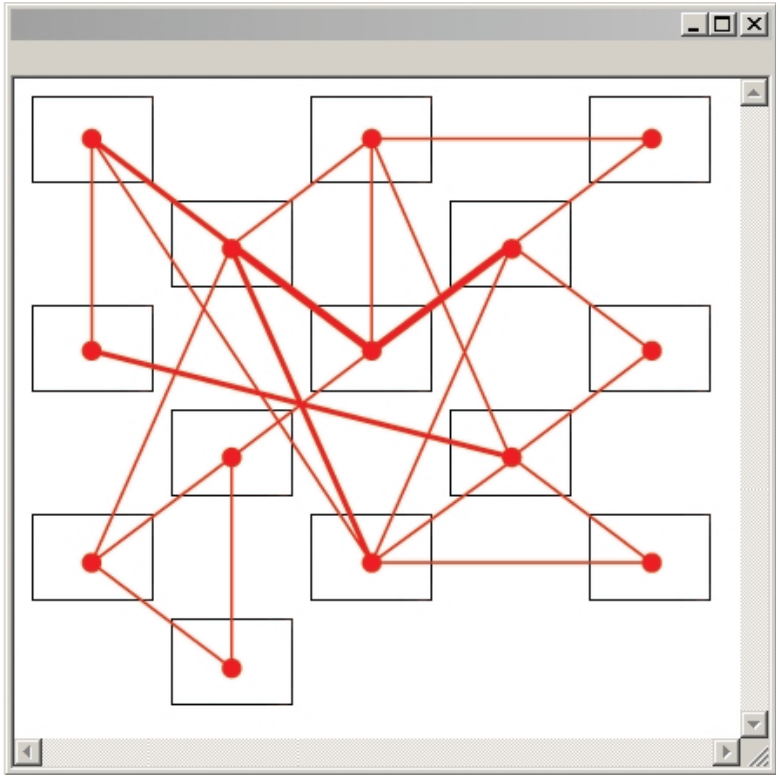
AutoSearch View



Database View

MOCK-UP





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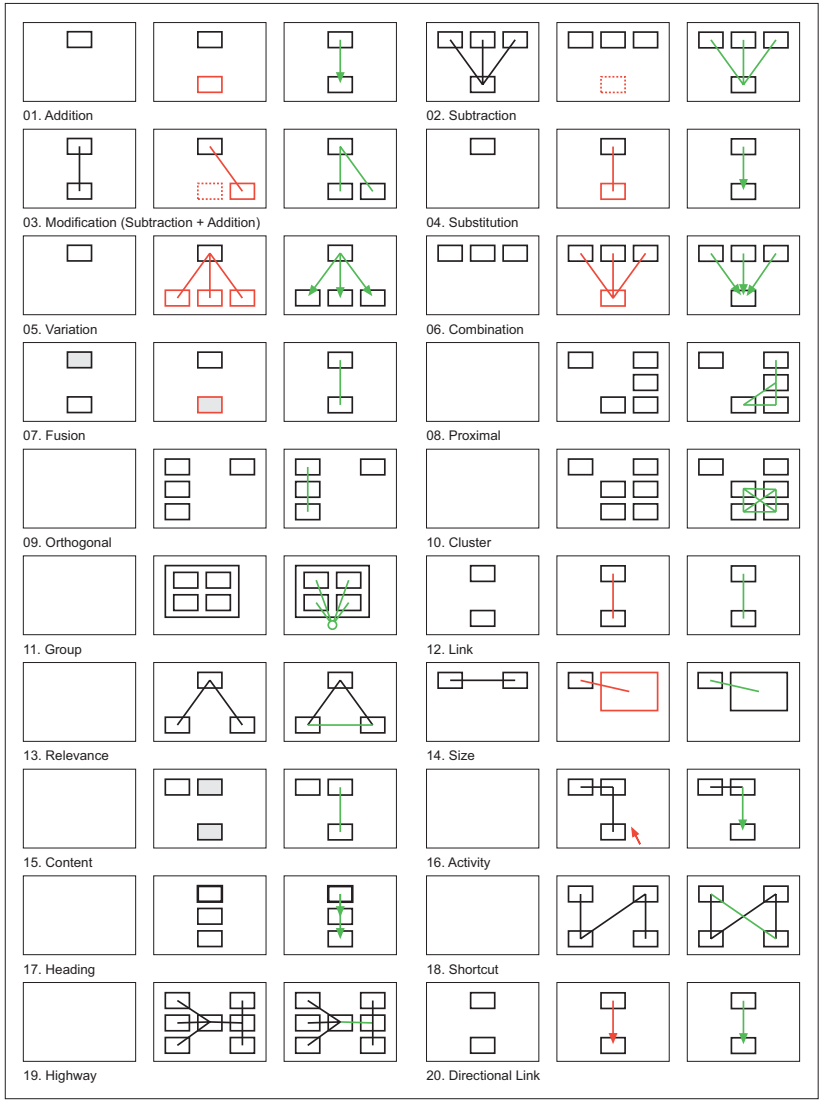
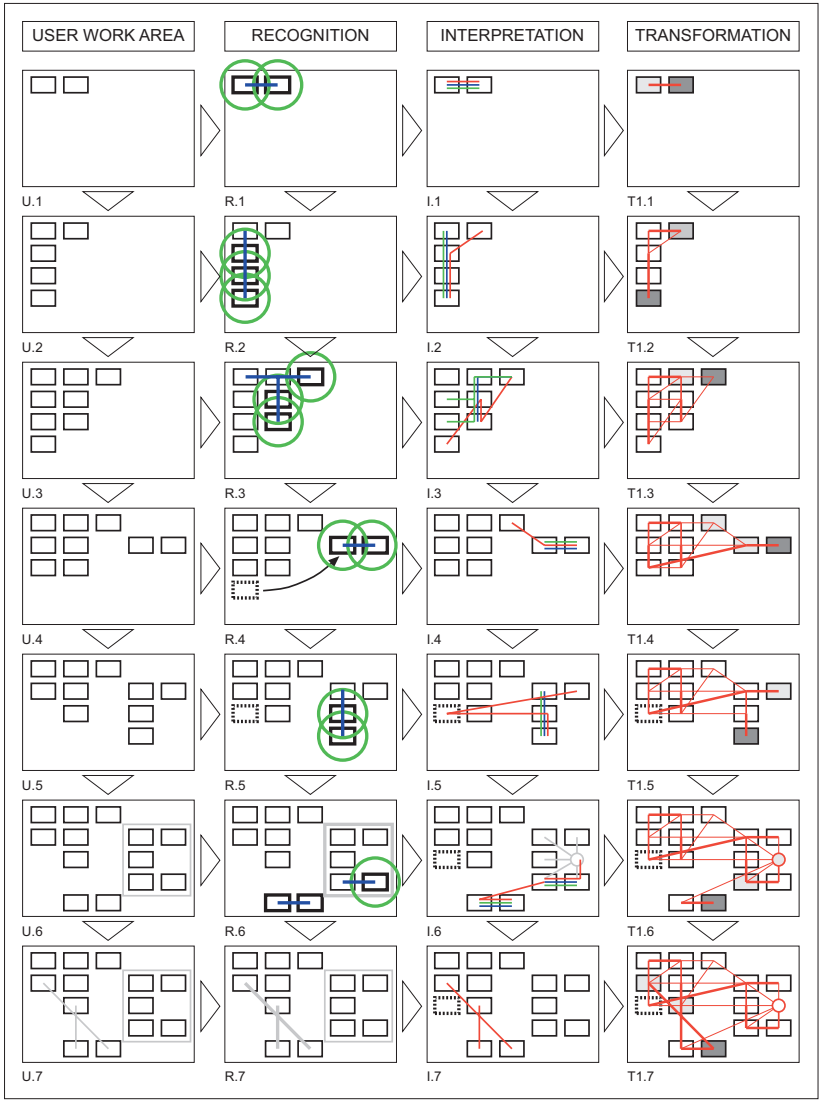

01. Addition
02. Subtraction
03. Modification (Subtraction + Addition)
04. Substitution
05. Variation
06. Combination
07. Fusion
08. Proximal
09. Orthogonal
10. Cluster
11. Group
12. Link
13. Relevance
14. Size
15. Content
16. Activity
17. Heading
18. Shortcut
19. Highway
20. Directional Link


USER WORK AREA
RECOGNITION
INTERPRETATION
TRANSFORMATION
U.1
R.1
I.1
T1.1
U.2
R.2
I.2
T1.2
U.3
R.3
I.3
T1.3
U.4
R.4
I.4
T1.4
U.5
R.5
I.5
T1.5
U.6
R.6
I.6
T1.6
U.7
R.7
I.7
T1.7

EWALL AGENT MODULE

A large number of collaborators may produce too much information for an individual to keep track of.

EWall will prioritize information for individuals based on their current foci.

Collaboration in large numbers may be inefficient.

EWall will automatically suggest smaller teams with focus on individual sub-tasks.

Discussions may get stuck on a specific issue or may be unable to develop a consensus.

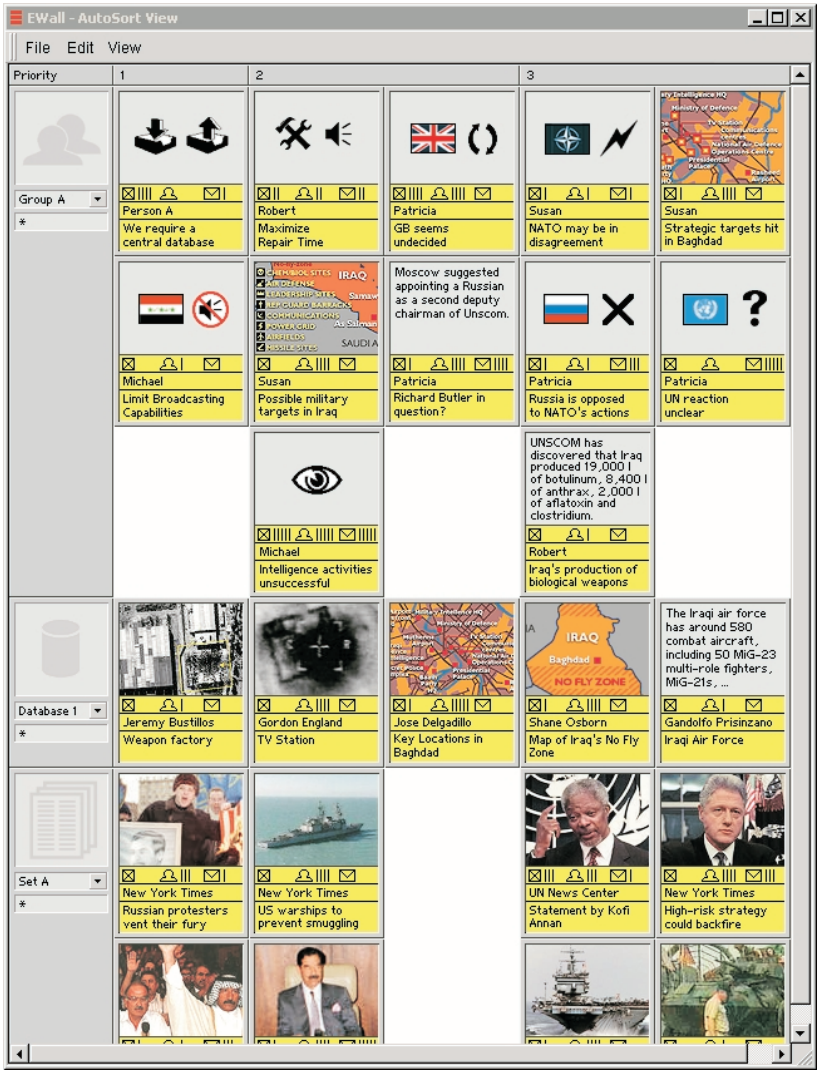
EWall will guide collaborators to maintain a healthy balance between evaluating existing and exploring new information.

Collaborators may not always work towards a common solution.

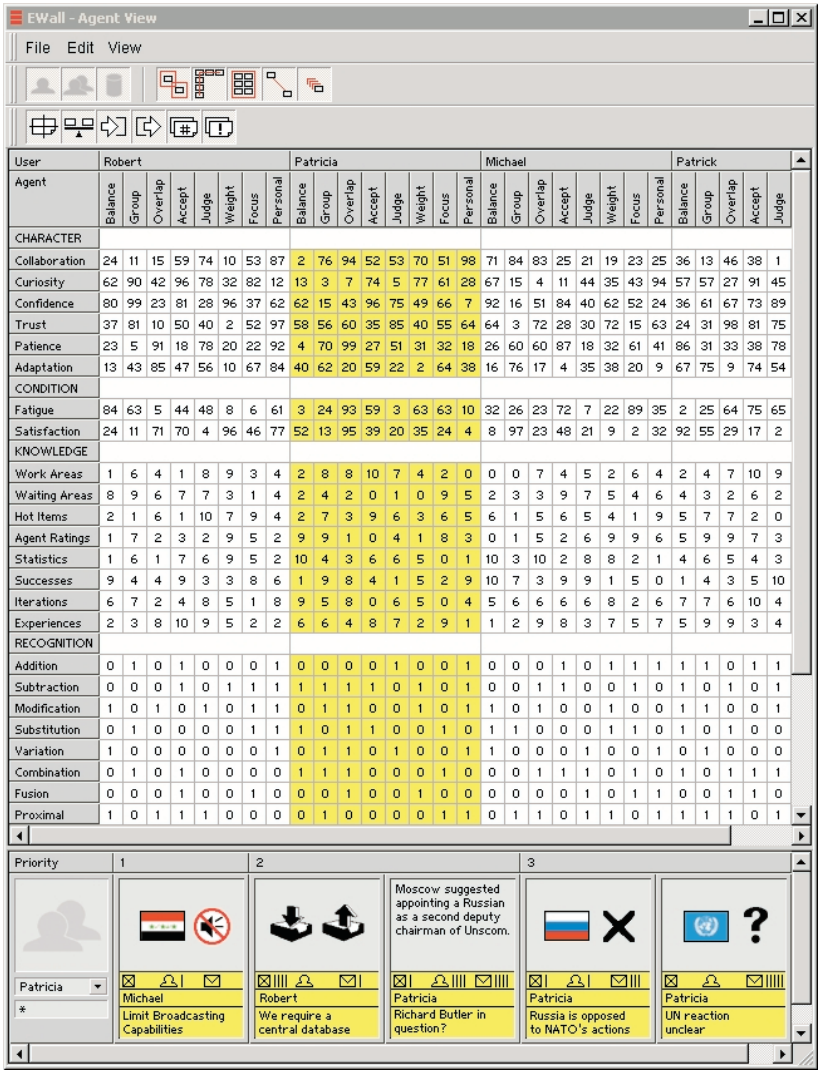
EWall will suggest directions towards a common solution.

Remote collaboration often makes it harder to learn about patterns of communication among individuals.

EWall will visualize the communication flow between individual collaborators.

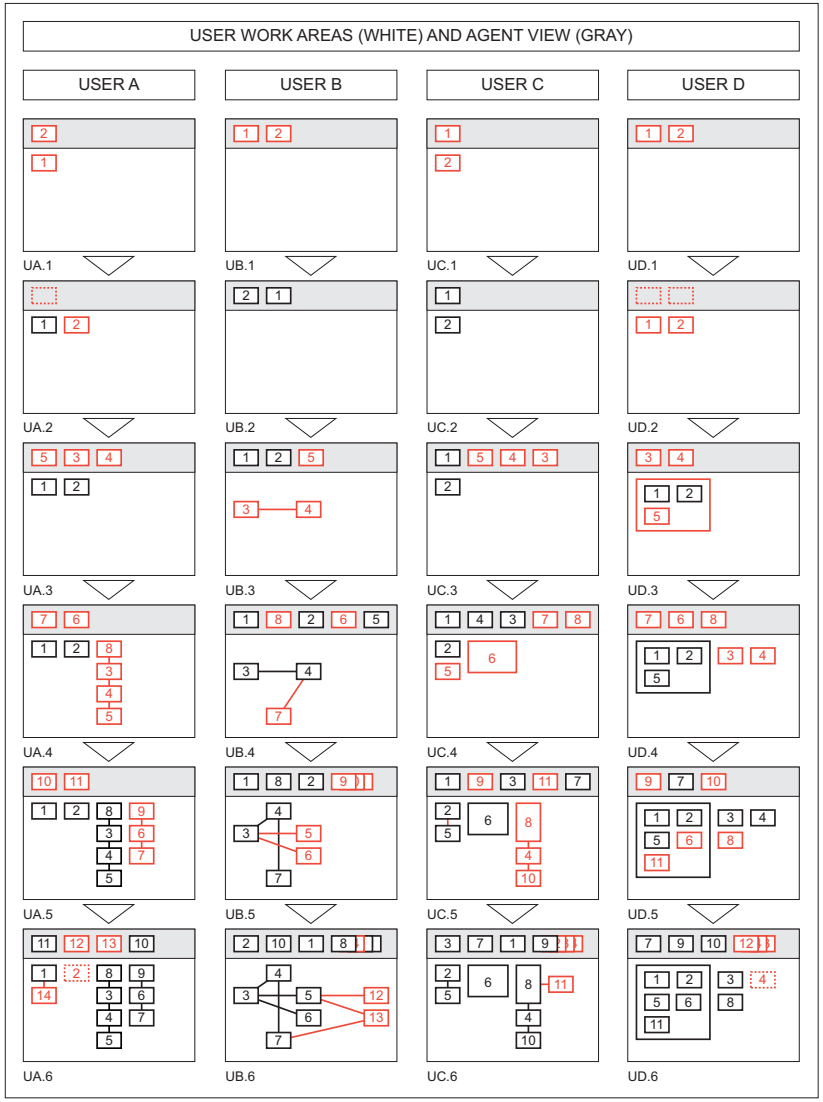


AutoSort View



Agent View

MOCK-UP


USER WORK AREAS (WHITE) AND AGENT VIEW (GRAY)
USER A
USER B
USER C
USER D
UA.1
UA.2
UA.3
UA.4
UA.5
UA.6
UB.1
UB.2
UB.3
UB.4
UB.5
UB.6
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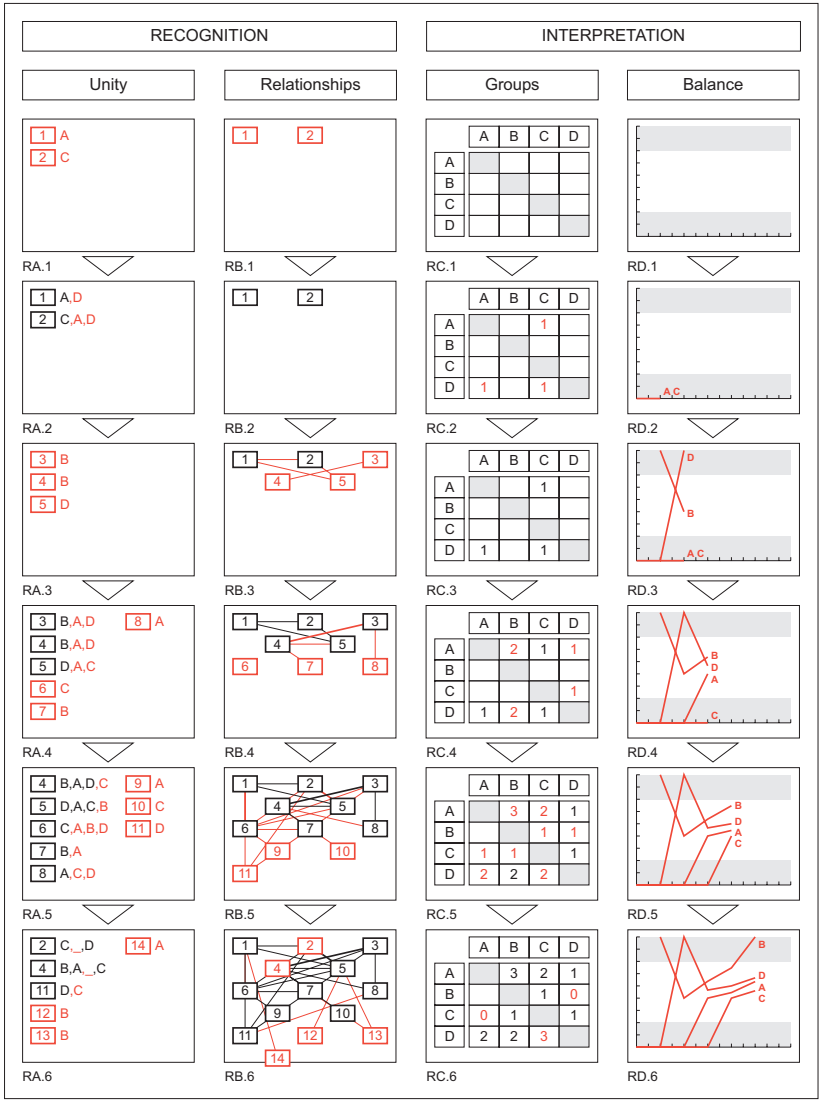
UD.1
UD.2
UD.3
UD.4
UD.5
UD.6


RECOGNITION
INTERPRETATION
Unity
Relationships
Groups
Balance
RA.1
RA.2
RA.3
RA.4
RA.5
RA.6
RB.1
RB.2
RB.3
RB.4
RB.5
RB.6
RC.1
RC.2
RC.3
RC.4
RC.5
RC.6
RD.1
RD.2
RD.3
RD.4
RD.5
RD.6

EWALL ARRANGEMENT MODULE

Creative readings of information arrangements are limited.

EWall will provide the mechanisms to rearrange information from any data source.

The authorship and history of information can easily be forgotten.

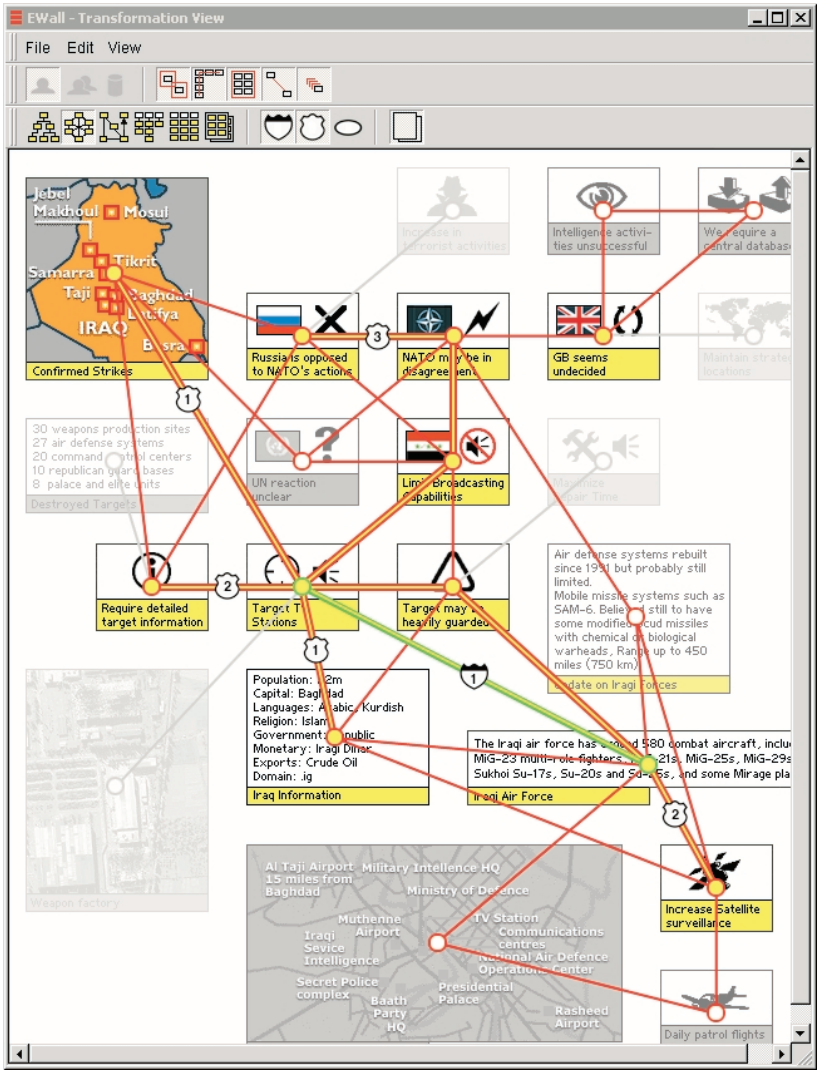
EWall will provide the mechanisms to restore previous stages of information arrangements and to track authorship history.

The importance of information and relationships is difficult to determine.

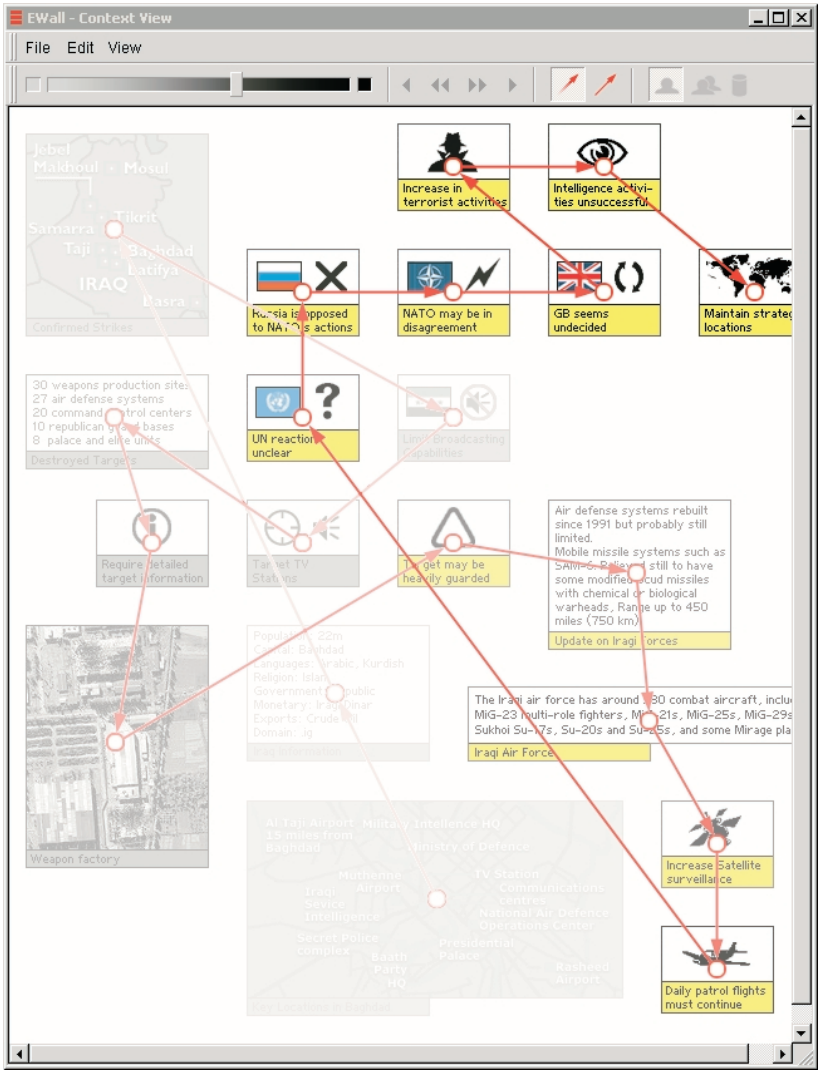
EWall will provide the mechanisms to establish and to distinguish different levels of importance between information and relationships.

Expected as well as unexpected information arrangements may trigger insight.

EWall will provide the mechanisms for voluntary as well as automatic control for generating new arrangements.

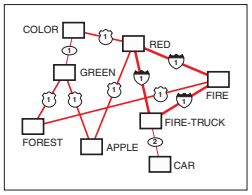


Transformation View

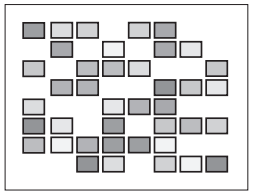


Context View

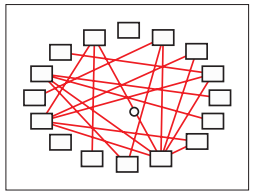
▮▮▮ MOCK-UP ▮▮▮



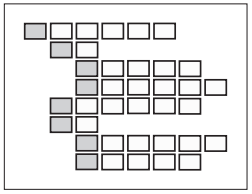
01. Highway



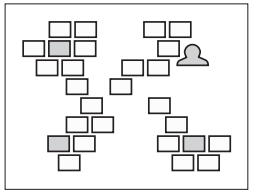
02. Fading



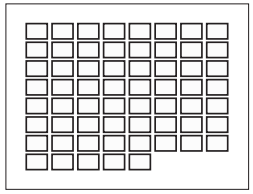
03. Circle



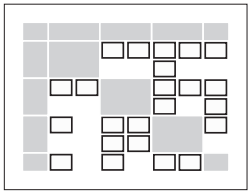
04. Outline



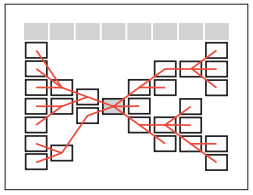
05. Magnet



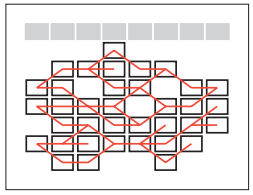
06. Random



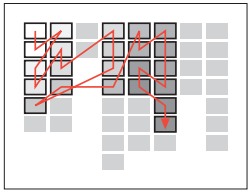
05. Team



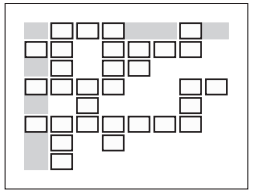
08. Venturi



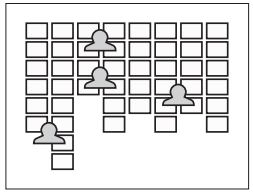
09. Timeline



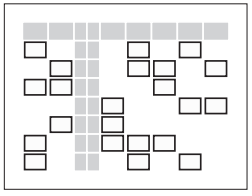
10. Context



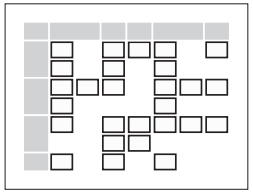
11. Crossover



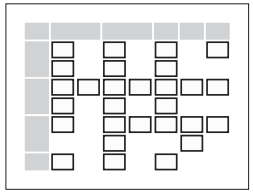
12. Convergence



13. Subject-Time Matrix

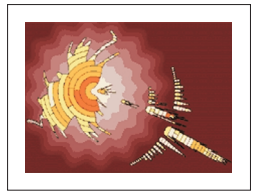


14. Subject-Priority Matrix

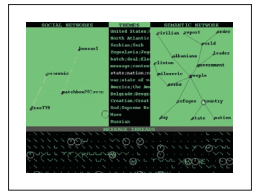


15. Subject-Depth Matrix

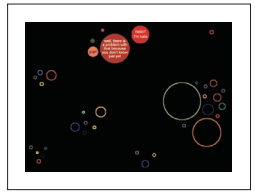
01. SmartMoney



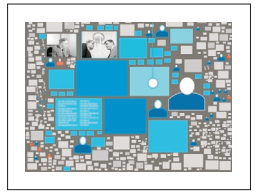
02. UMAP



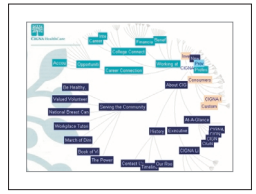
03. Conversation Map



04. ChatCircles

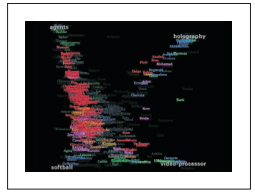


05. Viper

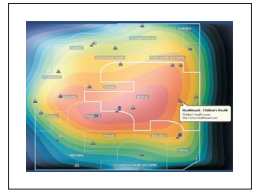


06. StarTree

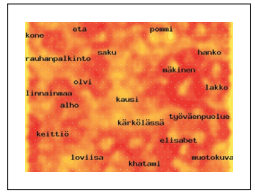
07. TheBrain



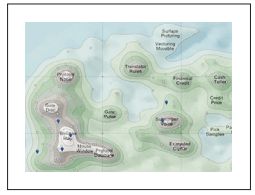
08. VisualWho



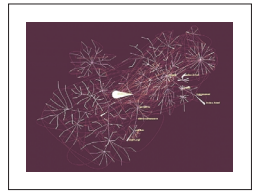
09. WebMap



10. WEBSOM

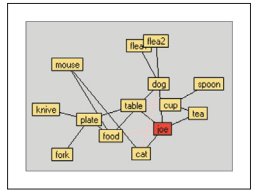


11. ThemeScape

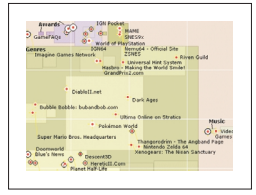


12. Anemone

13. ThinkMap



14. GraphLayout



15. MapNet

Disciplines \ Theories	Information Processing	Situated Learning	Evolutionary Models of CHI	Constructivism
CSCW Computer Supported Collaborative Work				
CHI Computer Human Interaction				
PD Participatory Design				
OC Organizational Change				
CSCL Computer Supported Collaborative Learning				
CAAD Computer Aided Architectural Design